



Chapter Four DEVELOPMENT ALTERNATIVES

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In the previous chapter, airside and landside needs that would satisfy projected demand over the planning period were identified. The next step in the master planning process is to evaluate the various ways these facilities can be provided. In this chapter, these facility needs will be applied to a series of airport development alternatives. As there are a number of possible alternatives, some intuitive judgement must be applied to identify those alternatives that have the greatest potential for implementation. The alternative analysis is a critical step in the planning process because it provides the underlying rationale for the final master plan recommendations.

Three basic conceptual alternatives can be considered. The first involves the transfer of projected aviation demand to other regional airports, or possibly to a new airport site. The second is a "no development" or "do nothing" alternative where the existing airport is left as it is. The third alternative involves a development program within the physical and environmental constraints that currently exist. The alternative concepts presented in this chapter are provided for the purpose of

reviewing the relative merits of each, as well as the impacts of the implementation of each alternative on the existing airport facilities, environs, and surrounding community.

TRANSFER OF AVIATION SERVICES

As discussed in Chapter One, Rolle Airfield is at a critical juncture with regard to determining its future regional aviation role. Additionally, it is ideally positioned to both contribute and to benefit from the ongoing economic and population growth being experienced by the City of San Luis. The closest public-use airport is Yuma International Airport which is located 10 nautical miles northeast of the Airfield. Given its proximity to San Luis' growing business and residential development, Rolle Airfield is better suited to meeting the long-range general aviation needs of San Luis and extreme southwestern Yuma County. As such, transfer of potential aviation activity to Yuma International Airport was deemed an undesirable alternative.

CONSTRUCTION OF A NEW AIRPORT

The alternative of developing an entirely new airport to meet the aviation needs of the City of San Luis and southwestern Yuma County was also considered. Like the transfer of services option, this too was found to be a less than favorable alternative, due mainly to economic and environmental considerations. Land acquisition, site preparation and the construction of a new airport facility can prove a very difficult and costly action. In a situation where public funds are limited, the replacement of a functional airport facility would represent an unjustifiable loss of a significant public investment. From social, political, and environmental perspectives, the commitment of a new large land area must be considered. In the last few years, public sentiment toward new airport construction has been rather negative, primarily because new airports normally require the acquisition of several large parcels of privately or publicly-owned land. Additionally, the development of a new airport similar to Rolle Airfield would likely take several years to become a reality. Furthermore, the potential exists for significant environmental impacts associated with disturbing a large land area when developing a new airport site. Consequently, the construction of a new airport, when the existing Rolle Airfield can be improved for considerably less cost, cannot be considered a prudent or feasible alternative.

DO-NOTHING ALTERNATIVE

When analyzing and comparing the costs and benefits of varied development alternatives, it

is important to consider the consequence of no future development at Rolle Airfield. The "do-nothing" alternative essentially considers keeping the Airfield in its present condition and not providing for any type of improvement to the existing facilities. However, aviation forecasts and facility requirement analysis for Rolle Airfield suggest both a current and future need for the development of a longer and wider main runway, an aircraft parking apron, taxiway system, navigational aids, runway lighting, minimal general aviation terminal facilities, aircraft storage facilities and an improved access road. It is important to remember that both the forecasts and facility requirements are based on potential future activity, however, if Rolle Airfield is to be a productive contributor to the dynamic growth happening in both San Luis and Yuma County it is essential that this development occurs.

AIRPORT DEVELOPMENT ALTERNATIVES

The previous chapter identified both the airside and landside facilities necessary to satisfy forecast demands through the planning period. The overall objective is to produce a balanced airside and landside complex to serve forecast aviation demands. The development alternatives for Rolle Airfield can be categorized into two functional areas: the airside (runways and taxiways) and landside (terminal facilities, aircraft storage hangars, and aircraft parking apron). Within each of these functional areas, specific facilities are required or desired. Although each of these areas is treated separately, each relates to and also effects the development potential of the other. Therefore, these areas

must be examined both individually and collectively, then integrated into a final plan that is functional, efficient, cost effective and minimizes environmental impacts. The result of this process is a fundamental airport concept that produces a realistic development plan.

AIRFIELD SAFETY CONSIDERATIONS

By their very nature, airfield facilities are the focal point of the airport complex. Due to their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the most critical factor in the determination of intelligent airport development alternatives. Particularly, the runway system requires the greatest commitment of land area and often imparts the biggest influence on the identification and development of other airport alternatives. Additionally, because of the nature of aircraft operations, a number of FAA design requirements must be considered when examining airfield improvements. These requirements can often have a substantial impact on the feasibility of various alternatives designed to meet airfield needs.

FAA design criteria defines the physical attributes of runways, taxiways, as well as the separation of facilities, and the limits of imaginary surfaces, which protect aircraft from objects that could present a hazard to navigation. As previously discussed in

Chapter Three, FAA design requirements are most often based upon the approach speed and wingspan of the most demanding aircraft that will operate at the airport. However, these requirements may also be affected by the airport's approach visibility minimums. An examination of these specifications for the design aircraft results in an FAA defined ARC that governs the elements of design standards for Rolle Airfield. Based upon the data presented in Chapter Three, the ARC governing the future runway development at the Airfield was determined to be ARC B-II, the standards of which are presented for comparison along with the existing B-I standards in **Table 4A**.

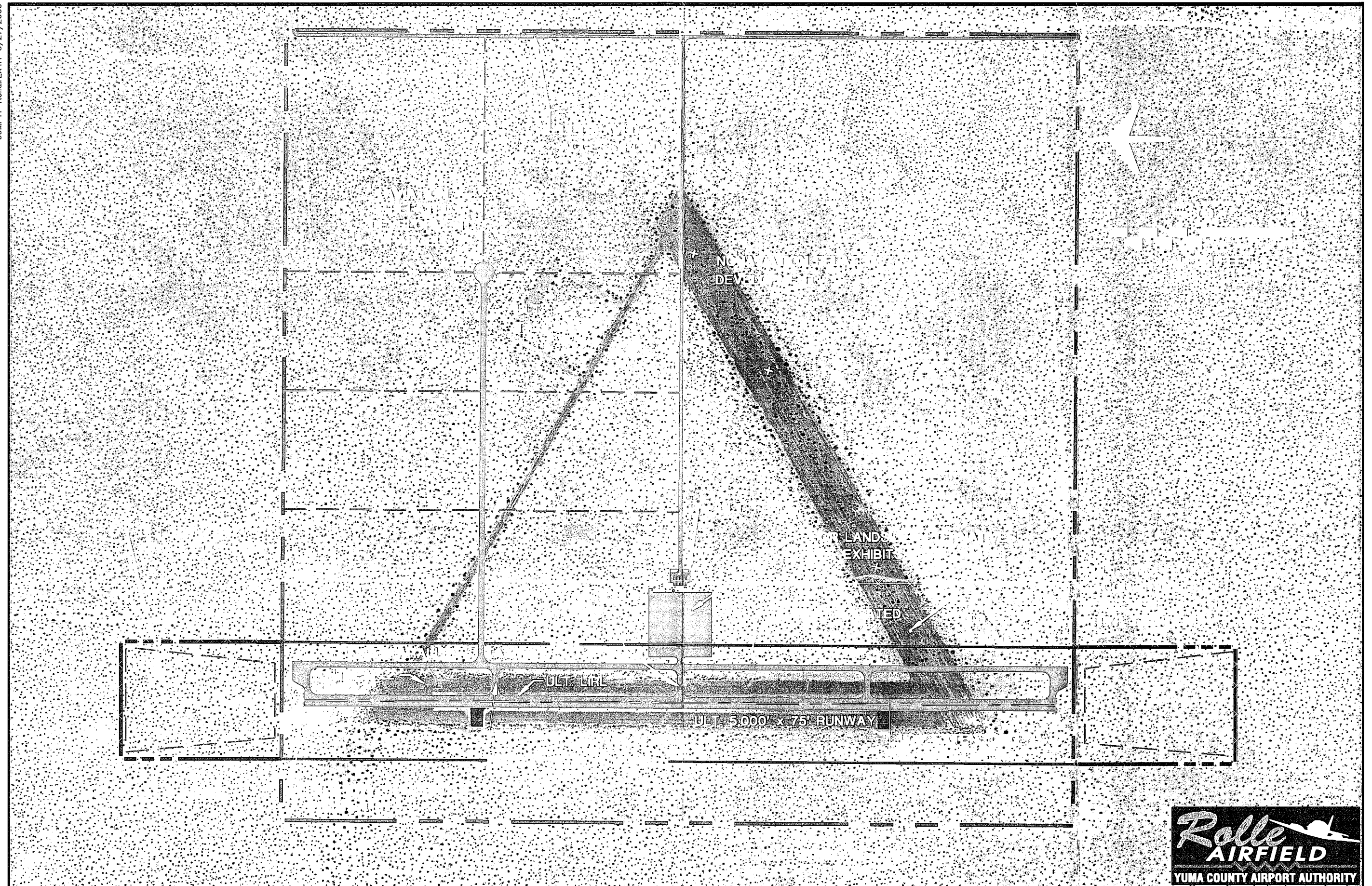
Given the facts that there are essentially no existing landside facilities at the Airfield and that there is more than adequate land available for landside development, meeting most of the required ARC B-II design standards should not be a problem. The two possible exceptions to this are the Runway Safety Area (RSA) width and length beyond each runway end; and the Runway Protection Zones (RPZ). The FAA's Airport Design Advisory Circular (AC) 150-5300-13 defines the RSA as "*A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.*" AC 150-5300-13 further defines the RPZ as "*An area off the runway end to enhance the protection of people and property on the ground.*"

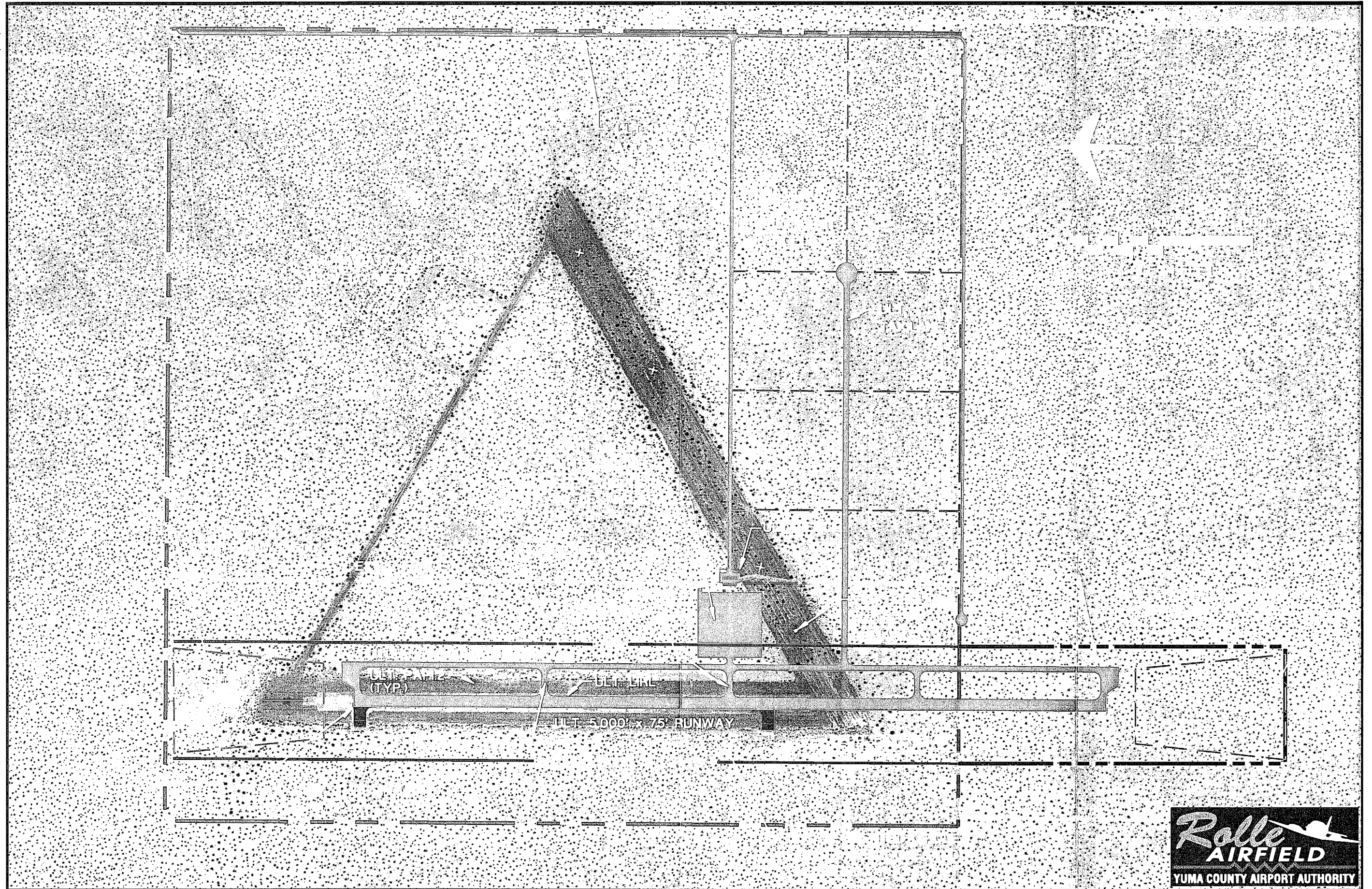
Table 4A Airfield Design Standards by ARC		
Airport Reference Code Approach Visibility Minimums	Existing B-I¹ One Mile	Ultimate B-II One Mile
<u>Runway</u>		
Width	60'	75'
Runway Safety Area (RSA)		
Width	120'	150'
Length Beyond Runway End	240'	300'
Object Free Area (OFA)		
Width	250'	500'
Length Beyond Runway End	240'	300'
Runway Centerline to:		
Parallel Taxiway Centerline	150'	240'
Edge of Aircraft Parking Apron	125'	250'
<u>Runway Protection Zones (RPZ)</u>		
Inner Width	250'	500'
Outer Width	450'	700'
Length	1,000'	1,000'
<u>Obstacle Clearance</u>	20:1	20:1
<u>Building Restriction Line (BRL)²</u>		
Distance from Runway Centerline	370'	495'
<u>Taxiways</u>		
Width	25'	35'
Safety Area Width	49'	79'
Object Free Area Width	89'	131'
Taxiway Centerline to:		
Parallel taxiway/Taxilane	69'	105'
Fixed or Moveable Object	44.5'	65.5'
<u>Taxilanes</u>		
Taxilane Centerline to:		
Parallel Taxilane Centerline	64'	97'
Fixed or Moveable Object	39.5'	57.5'
Taxilane Object Free Area	79'	115'
Source: FAA Airport Design Software Version 4.2D, F.A.R. Part 77, TERPS		
¹ Small Aircraft less than 12,500 pounds.		
² 35-Foot Building Height		

The specified RSA dimensions for an ARC B-II runway is 150 feet wide (centered on runway) and 300 feet beyond each runway end. As was recommended in Chapter Three and to insure compliance with this design definition, the approximately 300-foot wide

by 3,800 foot long (centered on runway) oiled area should be analyzed from an engineering perspective, and either stabilized or removed.

As for the future 2,200 foot runway extension shown on Exhibits 4A, 4B and 4C, in which





the RPZs would extend off Airfield property, the FAA recommends that positive control of these areas be obtained by Rolle Airfield, either by avigation easement or property acquisition.

Regarding other design standards, it is further advised that all shrubs and trees be removed from within the boundaries of both the runway object free area (OFA) and runway obstacle free zone (OFZ). Additional surfaces that affect the safe operation of aircraft at an airport include the primary surface, the transitional surfaces, and the building restriction line (BRL).

The primary surface and transitional surfaces are both components of Federal Aviation Regulations (FAR) Part 77, and are intended to protect aircraft operating areas from hazards that could affect the safe and efficient operation of aircraft arriving and departing the airport. The primary surface is a rectangular surface centered on the runway centerline and extends 200 feet beyond each runway end. It is recommended that all vegetation that may present an obstruction be cleared from the primary surface. The width of the primary surface is the same as the inner width of the runway protection zone. The transitional surface begins at the outside edge of the primary surface and rises at a slope of seven to one. There is no restriction on objects within the transitional area, as long as they do not penetrate the sloping surface. Currently, no objects other than native desert vegetation are known to penetrate either the primary or transitional surfaces at Rolle Airfield.

The building restriction line (BRL) is an imaginary line denoting a 35-foot clearance of the transitional surface. The distance for this line on either side of the runway from the

runway centerline is 495 feet for ARC B-II. Presently, there are no existing structures within these ultimate BRL's at Rolle Airfield. Future landside facilities will be designed and located accordingly.

AIRSIDE ALTERNATIVES

This section presents three separate airside development alternatives. Each of these alternatives provides for an ultimate runway length of 5,000 feet for Runway 17-35. Arriving at this 2,200 foot extension differs for each alternative and could, if necessary, be accomplished in stages. However, a minimum length of 3,310 feet is the recommended interim or initial runway length.

Airside Alternative 1, shown on **Exhibit 4A**, accomplishes the proposed 2,200 foot runway extension by extending each end of Runway 17-35 1,100 feet. In keeping with ARC B-II design standards, it further reflects an ultimate 75-foot runway width as well as an ultimate pavement strength rating of 30,000 pounds DWL. Initially, until such time as the demand for a future full-length parallel taxiway can be justified, Runway 17-35 can be adequately served by the proposed 35-foot wide, mid-field taxiway connecting the runway and proposed aircraft parking apron as illustrated on **Exhibit 4A**. For planning purposes, the future parallel taxiway and related exit stub taxiways are also depicted on **Airside Alternative 1**. The future parallel taxiway would be located at the ARC B-II specified distance of 240 feet from runway centerline to taxiway centerline. Like Runway 17-35, all the proposed taxiways would be pavement strength rated at 30,000 DWL.

The proposed 2,200 foot extension to Runway

17-35, places the RPZs for each runway end outside existing Airfield property. As discussed earlier, the FAA recommends that positive control of these areas be obtained by Rolle Airfield, either by avigation easement or property acquisition. As shown on Exhibit 4A, the area required to obtain positive control of each RPZ is approximately 19.34 acres (38.67 acres total). The main advantage of this alternative over Alternatives B and C is that it maximizes the use of existing Airfield property thus requiring less property acquisition and also allows for a balanced approach with respect to both airside and landside development. One disadvantage is that any extension to the south brings Runway 35 approach surface and the Runway 17 departure path closer to Mexican airspace which is located five miles south of Rolle Airfield.

Exhibit 4B, Airside Alternative 2, proposes the entire 2,200 foot runway extension be constructed to the north, at the Runway 17 end. As with the first alternative, Alternative 2 proposes an initial single taxiway connecting the runway and apron area, and also reflects a full-length parallel taxiway, again, should future activity demand it. The same runway length, width, runway strength rating as well as ARC B-II design standards detailed for Alternative One apply to this alternative also. The main advantage of this alternative over Alternatives 1 and 3 is that by having the extension to the north lessens any potential impacts on Mexican airspace. This alternative overall, however, is deemed less desirable than Alternative A, as it would require future property acquisitions totaling ± 38.28 acres for the proposed runway extension/related parallel taxiway, RPZ protection for Runway 17, and landside development.

The final alternative is presented on **Exhibit 4C, Airside Alternative 3**, and depicts the 2,200 foot runway extension being constructed to the south of Runway 35 end. As with the first two alternatives, Alternative 3 utilizes an initial single taxiway connecting the runway and apron area, and also illustrates a future full-length parallel taxiway. ARC B-II runway and taxiway design standards, which were detailed under Alternative One, apply to this alternative as well. Alternative 3, like the second alternative, would require property acquisition totaling ± 38.28 acres for the proposed runway extension/parallel taxiway system and RPZ protection for Runway 35. This alternative was also found to be less than desirable due mainly to two reasons: 1. The required property acquisition; 2. Like Alternative One, any runway extension to the south extends the Runway 35 approach surface and the Runway 17 departure path closer to Mexican airspace, which as previously noted is approximately 5 miles south of Rolle Airfield. As discussed in Chapter One, currently, aircraft departing Rolle Airfield to the south or upon a missed approach to Runway 17 are required to make a 180-degree turn to maintain flight within U.S. Airspace.

For all three alternatives, ARC B-II standards require runway safety area (RSA) clearing and grading of 300 feet beyond each runway end. A review of the aerial photograph of Rolle Airfield reveals no desert washes located near the ends of Runway 17-35 which would be affected by this clearing and grading. This effectively negates any requirement for a Section 404 (Clean Water Act) permit prior to construction. Further airside improvements, which apply to all three airside alternatives, include the establishment of a one-mile GPS approach to Runway 17, the installation of

visual glide slope indicators (PAPI-2) to both runway ends, low intensity runway lighting (LIRL) and threshold lighting for Runway 17-35, taxiway edge and centerline reflectors, runway/taxiway/helipad pavement markings, a lighted wind indicator/segmented circle, and supplemental wind cones near each runway end.

Each alternative shows the proposed location of the Airfield's rotating beacon. Additionally, each airside alternative shows, for ease of illustration and clarity, two items that are, in reality, landside considerations. One of these is the proposed Airfield vehicle access which consists of a north-south road alignment on the Airfield's eastern perimeter which is joined to the main Airfield access road which is to be orientated east-west effectively bisecting Airfield property. These access roads would all be paved. The second item, shown on each airside alternative, depicts airport property to be reserved for both future aviation related and nonaviation related land uses. The depicted aviation related land use parcels would be served by a single taxilane providing airfield access to the tenants.

LANDSIDE ALTERNATIVES

The primary landside facilities to be accommodated at the Airfield include aircraft storage hangars, aircraft parking apron, and general aviation terminal facilities. The interrelationship of these functions is important in defining a long range landside layout for Rolle Airfield. To a certain extent, landside uses need to be grouped with similar uses or uses that are compatible. Other functions should be separated, or at least have well defined boundaries for reasons of safety, security, and efficient operation. Finally, each

landside use must be planned in conjunction with the airfield, as well as ground access that is suitable to function. Runway frontage should be reserved for those uses with a high level of airfield interface, or need for exposure. Other uses with lower levels of aircraft movement, or little need for runway exposure can be planned in more isolated locations. The following briefly describes landside requirements.

Enclosed T-Hangars: The facility requirements analysis indicated that 18 T-Hangar units may be needed to satisfy projected long term demand.

Apron: It is assumed that, although the majority of the potential based aircraft will be stored in enclosed hangars, a small number of based aircraft will probably tiedown outside. Additionally, tiedown space must be provided for any transient aircraft wishing to utilize the Airfield. In Chapter Three, the facility requirements analysis indicated a short term need of two (2) tiedown positions and 1,140 square yards of aircraft parking apron. Long term requirements show a need for six (6) tiedown positions and 3,420 square yards of apron area. Both transient and based aircraft have been accounted for in these forecast facility requirements.

Terminal Facilities: General aviation (GA) terminal facilities have several functions including: providing passenger waiting areas, a pilot's lounge and flight planning area, restrooms, food and beverage concessions, administrative and management offices, storage, and various other needs. The facility requirements analysis indicated a short term need of 360 square feet and a long term requirement of 820 square feet of terminal facility space. As discussed in Chapter One,

basic terminal facilities are not currently available at the Airfield. While some of the more basic services could be provided within the proposed T-Hangar facilities, a future GA terminal site has been reserved and is depicted on each of the three (3) alternatives presented in this chapter. Reserving this site now can eliminate future facilities development conflicts. Utilities such as electricity, water, sewer and phone which are currently unavailable at the Airfield will be required to support such facilities. In addition, automobile parking areas are also required for this type of facility.

Parking and Access: Currently, there is no designated vehicle parking area at Rolle Airfield. A designated paved and marked parking area will be required to meet future Airfield demands. The facility requirements analysis indicated a short term need of 3,600 square feet (9 spaces) and a long term requirement of 7,200 square feet (18 spaces) to meet forecast vehicle parking demands.

All three landside alternatives presented in this section share the same proposed Airfield access road configuration. This road configuration is illustrated on each of the respective landside alternatives.

Fixed Base Operator (FBO): This essentially relates to providing areas for the development of facilities associated with aviation businesses that require airfield access. This could include businesses involved with (but not limited to) aircraft rental and flight training, aircraft charters, aircraft maintenance, line service, and aircraft fueling. Businesses such as these are characterized by high levels of activity with a need for apron space for the storage and circulation of aircraft. In addition, the facilities commonly

associated with businesses such as these include large, conventional type hangars which hold several aircraft plus attached office and business space. Utility services are needed for these type of facilities as well as automobile parking areas. The facility requirements analysis conducted in Chapter Three recommended the siting of such a facility should the need arise. The projections for long term facility requirements were determined to be 5,750 square feet of conventional hangar space.

Fuel Storage: As current airport usage does not warrant the construction of a fuel storage facility at Rolle Airfield, this alternatives analysis will only address the reservation of a site for a future fuel storage facility location. Any proposed location, however, should be convenient and readily accessible to both based and transient aircraft

Aviation Related Development Area Parcels: This involves reserving parcels of land for businesses or individuals who wish to construct their own aviation related facilities. These parcels would have airside access via taxilane. The location of the reserved aviation related parcels and related taxilane is depicted on each exhibit. Utilities such as water, sewer, electricity would be required for this area.

Nonaviation Related Development Area: This involves reserving a significant area of Airfield property for nonaviation related businesses which may find locating on Airfield property beneficial to their business. Such businesses provide an additional revenue source to the Airfield sponsor as well as giving the Airfield greater exposure and value to the non aviation public which may frequent these businesses. Types of businesses

which may express an interest include light manufacturing and distributing, restaurants, retail, warehousing, office complexes and other speciality-type businesses. While these parcels would be located conveniently along the main Airfield access road they, unlike aviation related businesses, would not require airside access to the Airfield. Access to water, sewer, and electric utilities would be required for this area as well.

Other Landside Considerations: The facility requirements chapter indicated that siting for a future aircraft wash rack/maintenance facility should be considered in any future landside development. As with the fuel facility, recommendations as to the location of a future aircraft wash rack/maintenance facility are incorporated in each landside alternative.

As previously noted, though they are actually landside considerations, the proposed airport access road and aviation/nonaviation related land use reserve options are also illustrated on the three airside alternatives presented earlier in this chapter. Additional items that must be considered but are not represented graphically on the landside alternative exhibits include a sanitary septic system compatible with future development, potable water and required fire suppression or other related fire safety equipment as it relates to new airport structures.

Exhibit 4D illustrates **Landside Alternative A**. This alternative, along with Landside Alternatives B and C, proposes development east of Runway 17-35, midway between each runway end. The proposed aircraft parking apron and terminal area would be served by the mid-field taxiway detailed in the airside

alternative section. An area is reserved along this apron for a future terminal facility, an FBO or conventional hangar site to be located south of the terminal site, and an auto parking area east of the GA terminal. At the southeast corner of the apron is an area designated for a future fuel storage facility. Located immediately north of the terminal facility is a site reserved for the proposed aircraft wash rack/maintenance facility. The aircraft tiedown area is located slightly southwest of the proposed GA terminal facility site on the aircraft parking apron. There is adequate room to add additional tiedowns, and the area could be divided into local and itinerant sections if so desired. North of the tiedown area is the proposed T-Hangar structure. Initially, in the short term, 12 T-Hangar units are projected while long term requirements suggest 18 total units. Arranging both the tiedown area and T-hangar structure in this configuration would allow for future expansion of each of these facilities in a north-south direction, parallel to Runway 17-35.

Advantages: The layout of both the tiedown area and T-hangar structure would allow for future expansion of each of these facilities in a north-south direction, parallel to Runway 17-35. No other significant advantages noted.

Disadvantages: None

Like the first alternative, **Landside Alternative B**, depicted on **Exhibit 4E**, proposes development on the east side of Runway 17-35 near the runway's midpoint. Also, similar to the first alternative, Alternative B depicts a future terminal facility centered on the apron's eastern edge with the auto parking area located east of the terminal facility, however, the FBO or conventional

hangar site for this alternative, is situated north of the terminal facility. The proposed aircraft wash rack/maintenance facility would be located immediately south of the terminal facility. Farther south along the apron's eastern edge is the proposed fuel storage facility site. The aircraft tiedown area is located directly west of the proposed GA terminal facility. South of the tiedown area is the proposed T-Hangar structure. As with the first alternative, this arrangement of the tiedown area and T-Hangar structure allows for future expansion of each of these facilities in a north-south direction, parallel to Runway 17-35.

Advantages: Similar to Alternative A, the tiedown area and T-Hangar structure configuration allows for future expansion of each of these facilities paralleling Runway 17-35. No other significant advantages noted.

Disadvantages: None.

The third and final alternative, **Landside Alternative C, Exhibit 4F**, is slightly different from the first two alternatives in that it proposes orienting the T-Hangar and aircraft tiedown area parallel to Runway 17-35. As for the remaining landside facilities shown on this alternative, the configuration is, for the most part, identical to Landside Alternative B. That is, the GA terminal facility is centered on the apron's eastern edge, further east is the proposed vehicle parking area, north of the terminal

facility is the FBO/conventional hangar site, and to the south of the terminal site is the aircraft wash rack/maintenance facility and fuel storage site.

Advantages: None.

Disadvantages: The location and orientation of the T-Hangar facility and tiedown area is not conducive to future aircraft parking apron construction.

SUMMARY

A preliminary master plan concept will be developed after the alternatives are reviewed by the Planning Advisory Committee and Yuma County Airport Authority. Once the preliminary master plan concept has been identified, cost estimates will be prepared for the individual projects, a development schedule will be outlined, and potential funding sources for recommended projects will be identified (including those projects that are eligible for federal or state funding assistance). The remaining chapters of the master plan will be used to refine a final concept through the development of detailed layouts and a phased development program. An environmental review of the proposed development will also be conducted to identify any potential environmental concerns related to future airport development.

